DOCUMENT RESUME

ED 323 117 SE 051 577

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TITLE Mathematics/Computer Integrated Curriculum, Grade 5.
SPONS AGENCY Texas Higher Education Coordinating Board, Austin.
PUB DATE Aug 90
NOTE 44p.; For related documents, see SE 051 573-578.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; Computer Uses in Education; *Course Content; Curriculum Design; Curriculum Development; Curriculum Guides; *Elementary School Mathematics; Geometry; *Grade 5; Graphs; Instructional Materials; Intermediate Grades; *Learning Activities; Mathematics Curriculum; *Mathematics Education; Mathematics Skills; Probability; Statistics; Teaching Guides
IDENTIFIERS *LOGO Programing Language

ABSTRACT

This manual designed for grade 5 is part of a series for a program to integrate the teaching and learning of mathematical and computer concepts and skills in the elementary school. The manual contains 27 lessons. Each lesson includes information on the topic, suggested grade level, mathematics concepts and skills, objective, prerequisite skills needed, and activities. Topics contained in the lessons include: (1) problem solving; (2) geometry; (3) numbers; (4) number concepts; (5) statistics; (6) measurement; and (7) probability, statistics, and graphing. Software programs used for the activities are specified for each lesson. (KR)

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Mathematics / Computer Integrated Curriculum Grade 5

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This curriculum material was produced under a grant from the Texas Higher Education Coordinating Board and the U.S. Education Department under the auspices of the Eisenhower Mathematics and Science Grants Program, Title II.

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How can Integrated Computer Curriculum be used in Elementary School (and can I do it?)

by: Michelle Murray-Hurst

Upon entering the last decade of the 20th century-- we are continuing to move forward into the age of technology. Computers of some types have been around since the 1940's and have been used in the school setting since the 1960's. But, are we using the computers effectively and if so, are we integrating them into the regular curriculum? Educators seem to be aware of the need for computer instruction in the middle and upper grades but often it is thought that computers in the lower elementary grades are only for drill, practice, and games. WRONG!! These young children are very interested in computers and are capable of solving some complex problems. Many times students find that grasping concepts is easier using the computer rather than the traditional methods of instruction. Because children are unique and have different learning styles it seems important to provide as many learning opportunities as possible. The computer allows increased methods by providing visual, tactile, and some times auditory responses.

But, let's face the problem, computers are an important part of instruction at all grade levels but the most important fact is to use them on a primary level. Elementary education is the perfect place to begin a strong base of computers because of these students' hunger for knowledge. Mathematics conveniently lends itself to the integration of the computer. It can be done and is being done today. Integration may take a little extra time and effort but the rewards could be bountiful. The mathematics

curriculum is relatively simple and all of the objectives may be taught or enriched by using the computer.

Now is the time that educators realize that computers are our friends and want to make our lives easier. It is our responsibility to allow our children to grow up with computer knowledge and not be afraid to experience new technological advances.

Integration of computers into the curriculum is here today and is something that can be easily expanded through ingenuity and creativity. Many curriculum documents to assist teachers in making this transition have been developed. This document was designed for kindergarten through sixth grade and the lessons can be presented by teachers with very little computer experience. So we recognize that integration can be easily done.

Computer Lesson 5.1

Topic: Problem Solving

Suggested Grade Level: 5

Mathematical Essential Element: 1

Descriptor: 1.1 and 1.9

Objective:

Content Description: make objects that have a definite pattern to help learners increase attention span, improve symbol/pattern recognition, develop abstract reasoning and sequential reasoning.

Prerequisite Student Skills: Be familiar with rotate, stripe and punch

Activities:

Load the program, *The Factory*

Follow instructions given on the screen

Use *The Factory* workbook

Instructional Resource: *The Factory*

Sunburst Communications

Computer Lesson 5.2

Topic: Problem Solving

Suggested Grade Level: 5

Mathematical Essential Element: 1

Descriptor: 1.1

Objective:

Content Description: Using an organized approach to problem solving

Prerequisite Student Skills:

Activities:

Load Gertrudes's Puzzle

Follow instructions on the screen

Choose "The Loop Puzzle"

Use the computer to solve puzzle

Use activity that accompanies the Loop Puzzles, pp. 10-13

Instructional Resource: Gertrudes's Puzzles
The Learning Company

Computer Lesson 5.3

Topic: Problem Solving

Suggested Grade Level: 5

Mathematical Essential Element: 1

Descriptor: 1.10

Objective:

Content Description: Use practical situation from books to solve problems from real-life situations.

Prerequisite Student Skills:

Activities: Read the book, *Play Ball, Amelia Bedelia* , and answer questions such as:

1. If a box of cookie mix makes 4 dozen cookies, how many boxes would she need for each player to have 1/2 dozen cookies per player? Hint: There are nine players on the team.
2. Practice started at 9:30, and it lasted for 1 hour 45 minutes. What time was practice over?
3. Have students make up their own problems on measurement.

Instructional Resource: *Play Ball, Amelia Bedelia*; Parrish, Peggy; Greenwillow Books, N.Y.

Computer Lesson 5.4

Topic: Problem Solving

Suggested Grade Level: 5

Mathematical Essential Element: 1

Descriptor: 1.1

Objective:

Content Description: Develop an organized approach to solving applications involving statistics.

.

Prerequisite Student Skills: Definition of factorial and fundamental counting principal.

Activities: Use BASIC programming language.

```
10 PRINT "Type in the number to get its factorial."
15 PRINT "Press CONTROL/RESET to stop the program."
20 INPUT N
30 FACT =1
40 CT =0
50 CT =CT + 1
60 FACT = FACT * CT
70 IF CT < N  THEN 50
80 PRINT FACT; " is the factorial of " ;N
85 REM LINE 90 MAKES PROGRAM RUN OVER AND OVER
90 GOTO 10
100 END
```

To execute program, type RUN

Computer Lesson 5.5

Topic:Problem Solving

Suggested Grade Level:5

Mathematical Essential Element:1

Descriptor: 1.1 & 1.8

Objective:

Content Description: To use program to find value of pi using the geometric patterns of circles and using a calculator

Prerequisite Student Skills: know terms: circumference, diameter, radius and pi

Activities:

N for NEW SHAPE

1 for POINT

RETURN

1 for DRAW

2 for CIRCLE

3 OTHER

A

RETURN

2 NEW POINT (use arrow keys to set radius)

RETURN

ESC

M for MEASURE

1 LENGTH

AB

RETURN

RETURN (gives you radius for AB)

ESC

5 MEASURE

A

RETURN

AB

RETURN(gives you circumference, C:A(B)

After several computations with a calculator, compare ratio of circumference and diameter.

Instructional Resource: Sunburst Communications

The Geometric preSupposer

Computer Lesson #5.6

Topic: Problem Solving

Suggested Grade Level:5

Mathematical Essential Element: 1

Descriptor: 1.3

Objective:

Content Description: Use polygons to make predictions based on the number of sides of the polygons

Prerequisite Student Skills: Defintions of polygons

Activities:

Use the computer to draw polygons beginning with 3 sides and continue through 18 sides.

Steps:

Choose N (new shape)

Press 6 (polygon)

Press 3 (triangle)

Return

Press 2 (choose radius)

Press 2 (length of radius-this may vary)

Return

Continue above, increase step 3 by one each time until you get 18.

Instructional Resource: Sunburst Communications

The Geometric preSupposer

Computer Lesson 5.7

Topic: Patterns, Relations and Functions

Suggested Grade Level: 5

Mathematical Essential Element: 2

Descriptor: 2.4

Objective:

Content Description: Constructing a set of ordered pairs by using a given rule or a given set of pairs to generate the second members of the new pairs using a calculator or computer where appropriate.

Prerequisite Student Skills: Understand across, up and down, right and left

Activities:

Load game

Choose 5 TIC TAC TOC

Use activity sheets on pp. 23, 24, 25

Instructional Resource: Bumble Games
The Learning Co.

Computer Lesson 5.8

Topic: Prime Numbers

Suggested Grade Level: 5

Mathematical Essential Element: 3

Descriptor:

Objective:

Content Description: Use Terrapin Logo to check to see if a number is prime or composite

Prerequisite Student Skills: Know definitions of prime and composite

Activities:

Load Terrapin Logo

Type in the following:

```
TO CHECK :N :D
IF :D=1 PRINT "PRIME STOP
IF REMAINDER :N :D=0 PRINT "COMPOSITE STOP
CHECK :N :D-1
END
```

Press CONTROL/C

To run, type CHECK N D

N is the number to check, and D is the greatest integer less than or equal to the square root of N.

Instructional Resource: Terrapin Logo

Computer Lesson 5.9

Topic: Measurement

Suggested Grade Level:5

Mathematical Essential Element: 5

Descriptor: 5.2

Objective:

Content Description: Developing and applying formulas for the circumference of a circle, using estimation where appropriate

Prerequisite Student Skills: know definition of circumference

Activities:

Press N for NEW SHAPE

Press 1 for POINT

RETURN

Press 1 for DRAW

Press 2 for CIRCLE

Press 3 OTHER

Press A

RETURN

2 NEW POINT (establishes radius; use arrow keys to set radius)

RETURN

ESC

M for MEASURE

5 CIRCUMFERENCE

A

Radius AB

RETURN

RETURN

C=A(B)

ESC

To continue: Press N for NEW SHAPE.

Instructional Resource:Sunburst Communications

The Geometric preSupposer

Computer Lesson 5.10

Topic: Measurement

Suggested Grade Level: 5

Mathematical Essential Element: 5

Descriptor: 5.9

Objective:

Content Description: Exploring the relationship between units to convert measures expressed in given units to other units in the same measurement system.

Prerequisite Student Skills: know how many hours are in one day; knoe how to write a simple procedure by looking at an example

Activities:

```
10 LET HR = 48
20 LET D = HR/24
30 PRINT HR;"HOURS EQUAL"
40 PRINT D;"DAYS"
RUN
10 LET HR = 84
20 LET D = HR/24
30 PRINT HR;"HOURS EQUAL"
40 PRINT D;"DAYS"
RUN
```

Which line would you change to make the computer print this? 120 HOURS EQUAL 5 DAYS; write a procedure using this data.

To continue, choose your own hours, and write your own procedure.

Instructional Resource: BASIC

Computer Lesson 5.11

Topic: Measurement

Suggested Grade Level: 5

Mathematical Essential Element: 5

Descriptor: 5.4

Objective:

Content Description: Find volume of a rectangular prism.

Prerequisite Student Skills: Know the definition of prism and know how to find volume.

Activities: Fold up a sheet of paper to make a rectangular box and find the volume of the box. Make boxes of various depths. Compare the volumes.

Use Logo to draw box:

HOME

CS

Repeat 2[FD 5 LT 90 FD 5 RT 90 FD 60 RT 90 FD 5 LT 90 FD 5 RT 90 FD 40 RT 90]

CHALLENGE: Use Logo to draw the figure in three dimensions.

Instructional Resource: Terrapin Logo

Computer Lesson 5.12

Topic: Measurement

Suggested Grade Level: 5

Mathematical Essential Element: 5

Descriptor: 5.9

Objective:

Content Description: converting minutes to hours

Prerequisite Student Skills: know how many minutes are in an hour

Activities:

```
10 HR=0
20 PRINT "ENTER THE NUMBER OF MINUTES TO CHANGE INTO HOURS"
30 INPUT N
40 IF N<60 THEN 100
50  N=N-60
60 HR=HR+1
70 IF N>=60 THEN 40
100 PRINT HR; "HOURS;" N; "MINUTES"
110 GOTO 10
120 REM LINE NUMBER 110 MAKES THE PROGRAM REPEAT WITHOUT TYPING
RUN EACH TIME
```

Instructional Resource: BASIC Language

Computer Lesson 5.13

Topic: Measurement

Suggested Grade Level: 5

Mathematical Essential Element: 5

Descriptor: 5.9

Objective:

Content Description: convert measures, feet to yards

Prerequisite Student Skills: know how many feet are in a yard

Activities:

```
10 YD = 0
20 PRINT "ENTER THE NUMBER OF FEET TO CHANGE INTO YARDS"
25 PRINT "ENTER THE NUMERAL 0 TO END."
30 INPUT N
40 IF N < 3 THEN 100
50  N=N-3
60 YD = YD + 1
70 IF N > =3 THEN 40
100 PRINT YD; "YARDS"; N; "FEET"
110 GOTO 10
120 REM LINE NUMBER 110 MAKES THE PROGRAM REPEAT WITHOUT TYPING
      RUN EACH TIME
130 END
```

To execute this program type RUN

Instructional Resource: BASIC Language

Computer Lesson 5.14

Topic: Measurement

Suggested Grade Level: 5

Mathematical Essential Element: 5

Descriptor: 5.9

Objective:

Content Description: Convert measures; inches to feet

Prerequisite Student Skills: know the number of inches in one foot

Activities:

Use BASIC Language

```
10  FT = 0
20 PRINT "Enter the number of ft to change into feet and inches."
30 INPUT IN
40 IF N<12 THEN 100
50  IN=IN-12
60 FT=FT+1
70 IF X >=12 THEN 40
100 PRINT FT; " FEET ";IN; " INCHES."
110 REM LINE NUMBER 120 MAKES THE PROGRAM REPEAT WITHOUT TYPING
RUN EACH TIME.
120 GOTO 10
```

To execute the program, type RUN

To stop the program, presss CONTROL/C at the same time.

Instructional Resource: BASIC Language

Computer Lesson 5.15

Topic: Classifying Angles

Suggested Grade Level: 5

Mathematical Essential Element: 6

Descriptor: 6.4

Objective:

Content Description: Identify angles as acute, right, obtuse, straight.

Prerequisite Student Skills: Know the definitions of degree and angle and logo commands.

Activities:

90 degrees-right angle

```
HOME
CS
FD 30
BK 30
RT 90
FD 30
```

Less than 90 degrees - acute angle

```
HOME
CS
FD 50
BK 50
RT 30
FD 50
```

Greater than 90 degrees-obtuse angle

HOME
CS
FD 40
BK 40
RT 150
FD 40

180 degrees-straight angle
HOME
CS
FD 50
BK 50
RT 180
FD 50

Instructional Resource: Terrapin Logo

Computer Lesson 5.16

Topic: Measurement

Suggested Grade Level: 5

Mathematical Essential Element: 5

Descriptor: 5.1

Objective:

Content Description: Name the type of polygon as related to the number of sides and angles

Prerequisite Student Skills: Basic logo commands, repeat, straight line, angles, polygon.

Activities:

To make a triangle, follow these steps: FD 50 RT 120 FD 50 RT 120 FD 50 RT 120. The REPEAT command may be used as follows: REPEAT 3[FD 50 RT 120]

Draw and name regular polygons:

1. Triangle

HOME

CS

REPEAT 3[FD 50 RT 120]

2. Square

HOME

CS

REPEAT 4[FD 50 RT 90]

3. Rectangle

HOME

CS

REPEAT 2[FD 20 RT 90 FD 50 RT 90]

4. Parallelogram

```
HOME
CS
RT 20
FD 40
RT 70
FD 60
RT 110
FD 40
RT 70
FD 60
```

6. Pentagon

```
HOME
CS
REPEAT 5[FD 50 RT 72]
```

7. Hexagon

```
HOME
CS
REPEAT 6[FD 50 RT 60]
```

8. Octagon

```
HOME
CS
REPEAT 8[FD 50 RT 45]
HOME
CS
```

Instructional Resource: Terrapin Logo

Computer Lesson 5.17

Topic: Geometry

Suggested Grade Level: 5

Mathematical Essential Element: 6

Descriptor: 6.6

Objective:

Content Description: parallel lines represent events occurring at the same time, but separately

Prerequisite Student Skills: know definition of parallel lines

Activities:

C-PARALLEL LINES

After each line, press return

1. ST

FD 40

RT 60

FD 40

RT 120

FD 70

HOME

HT

CS

ST

2. FD 40

RT 90

FD 40

RT 90

FD 60

HOME

HT

CS

ST

3. FD 40

RT 120

FD 40

RT 60

Complete the necessary commands to form C parallel lines.

. . .

4. FD 40

RT 60

FD 40

Complete the necessary commands to form

C parallel lines.

. . .

Hint: The total of the two turns must equal 180 degrees.

Z-PARALLEL LINES

1. RT 90

FD 40

RT 120

FD 30

LT 120

FD 50

HOME

CS

ST

6. RT 90

FD 40

RT 90

FD 30

Complete the necessary commands to form Z-parallel lines.

. . .

(Hint: The right turn must equal the left turn.

Now you may design some of your own parallel lines.

Instructional Resource: Terrapin Logo

Computer Lesson 5.18

Topic: Geometry-Properties & relationships of geometric shapes and their applications

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Suggested Grade Level: 5
Mathematical Essential Element:6
Descriptor: 6.4
Objective:

Content Description: estimating and then measuring angles

Prerequisite Student Skills: know definition of angle
Activities:
Students work in pairs. One student chooses degrees, and the other student (without looking at the degrees his partner chose) looks at the angle and estimates the number of degrees. Then he measures the angle to see how accurate his estimate is.
Load the Geometric preSupposer
N
3 ANGLE
90
RETURN
Student estimates angle
M
4
ABC
RETURN
RETURN
ESC-PRESS TWICE
N
3 ANGLE

45

RETURN

Student estimates angle

M

4

ABC

RETURN

RETURN

ESC-PRESS TWICE

To continue: choose varying degrees for your angles, estimate and then measure.

Instructional Resource:Sunburst Communications

The Geometric preSupposer

Computer Lesson 5.19

Topic: Geometry

Suggested Grade Level: 5

Mathematical Essential Element: 6

Descriptor: 6.7

Objective:

Content Description: Name triangles according to sides or angles

Prerequisite Student Skills: Define equilateral, isosceles, scalene, right, obtuse, and acute. Define and explain exterior angles. Basic logo commands or BASIC graphics.

Activities:

1) Equilateral

```
HOME
CS
REPEAT 3[FD 50 RT 120]
```

2) Right Isosceles

```
HOME
CS
RT 45
FD 100
RT 90
FD 100
RT 135
FD 141
```

3) Right acute angle

```
LT 90
FD 90
```

RT 90

FD 40

RT 140

FD 50

4) Scalene and Obtuse

RT 50

FD 30

RT 70

FD 40

RT 150

FD 50

Instructional Resource: Terrapin Logo

Computer Lesson #5-20

Topic:Geometry

Suggested Grade Level: 5

Mathematical Essential Element: 6

Descriptor: 6.1-6.2

Objective:

Content Description:constructing examples of symmetric and congruent figures using computer; constructing examples of reflection using computer

Prerequisite Student Skills:know definition of terms

Activities:

press N for NEW SHAPE

press 3 for ANGLE

number of degrees is 45

press 2 to LABEL

press 3 for REFLECTION

label reflection of AB reflected in BC

follow process in steps 5 & 6 using every segment over new segment

Extension:

How many 45 degree angles make aa circle?

Trace construction and create a unique design.

Make a polygon of the construction.

Name the polygon.

Instructional Resource:Sunburst Communication

The Geometric presupposer

Computer Lesson 5.21

Topic: Geometry (Pi)

Suggested Grade Level: 5

Mathematical Essential Element: 6

Descriptor: 6.3

Objective:

Content Description: Learning about a special number, pi

Prerequisite Student Skills: Know definition of pi

Activities:

ST

REPEAT 360[FD 1 RT 1]

RETURN- (This draws circle)

REPEAT 180[FD 1 RT 1]

RETURN

PRINT XCOR (to get diameter)

RETURN

PRINT 360/114.586

RETURN

Record your answer on paper

CS

RETURN

HOME CS

REPEAT 180[FD 1 RT 2]

RETURN-(This draws circle)

REPEAT 90[FD 1 RT 2]

RETURN

PRINT XCOR

RETURN

PRINT 180 / ? (diameter)

RETURN

Record your answer on paper

HOME CS

REPEAT 720[FD .5 RT .5]

RETURN

REPEAT 360[FD .5 RT .5]

RETURN

PRINT XCOR

RETURN

720/?

RETURN-(This gives you result)

Result/2

RETURN

HOME CS

No matter what size the circle is, the values for C/D are about the same...C/D=3.14. This special number is known as pi! Therefore, C=PI*D.

Instructional Resource:Learning Math with Logo
Terrapin

Computer Lesson 5.22

Topic: Geometry

Suggested Grade Level: 5
Mathematical Essential Element: 06
Descriptor: 6.3
Objective:

Content Description: Construct circles and identify the radius, diameter, chord, center, and circumference.

Prerequisite Student Skills: know definition of terms above.
Activities: Use the computer to draw the circle, the radius, diameter, chord, center, and circumference.
Press N for new shape
Press 1 for point
Press return
Press 1 (draw)
Press 2 (circle)
Press 3 (other) mark center A, return
Press 2 (new point) use arrows to make B (radius),return (this draws the circle)
Press ESC
Press 2 Label
Press 4 move point to place it on the circle
Choose S for small movement
Press return to locate point
Press 4 move point to other end of diameter
Press return to label end of diameter
Esc

1 Draw

1 Segment

Name segment by endpoints-return

Start chord-press esc

Press 2 for label

Press 4 for move point

Move point on circle to make the chord

Press return to label the end of the chord

Press 4 for another movable point and move point to other end of chord

Press return to label end point

Press esc

Press 1 draw

Press 1 for segment

Name segment by endpoints-return

Instructional Resource: Geometric preSupposer
Sunburst Communications

Computer Lesson 5.23

Topic: Geometry

Suggested Grade Level: 5

Mathematical Essential Element: 6

Descriptor: 6.2

Objective:

Content Description: use the computer to construct examples of rotations

Prerequisite Student Skills:

Activities:

Load The Factory

Make selections from the menu

Choose #3

Use the circle overlay p. 47-49

Choose Easy to begin and then advance to Hard as students learn process

Follow directions as given on screen

Students make selections relating to rotation, punch and stripe.

Instructional Resource: The Factory

Sunburst Communications

Computer Lesson 5.24

Topic: Probability, Statistics and Graphing

Suggested Grade Level:5
Mathematical Essential Element: 7
Descriptor: 7.10
Objective:

Content Description: Plotting points on a whole coordinate plane that represents ordered pairs of whole numbers, arising from application problems

Prerequisite Student Skills:
Activities:
Load program
Choose 6 Bumble Dots
Use activity sheets pp. 27-29

Instructional Resources: Bumble Games
The Learning Co.

Computer Lesson 5.25

Topic: Graphics (Low Resolution)

Suggested Grade Level: 5

Mathematical Essential Element: 7

Descriptor: 7.10

Objective:

Content Description: Low resolution graphics-introductory lesson

Prerequisite Student Skills: Know definitions of horizontal and vertical

Activities:

Materials: graph paper and pencil

Students graph their initials on graph paper, then on computer

1. holes on graph paper should be at bottom of page
2. number across top of page inside blocks (0-39)
3. number down left side of page inside blocks (0-39) (screen will accommodate 0-39)
4. pencil in your initial in the middle of the page and a period; be sure to shade in blocks
5. then write commands for initial and period

Example of the initial H.:

```
10 GR
20 COLOR = 3
30 PLOT 25,18
40 HLIN 21,22 AT 15
50 VLIN 12,18 AT 20
60 VLIN 12,18 AT 23
RUN
```

To clear screen, type:

TEXT: To erase graphics from screen

LIST: To see steps of the program

HOME : To clear screen

NEW: To erase program from the computer's memory

Computer Lesson 5.26

Topic: Graphics (high resolution)

Suggested Grade Level: 5
Mathematical Essential Element:7
Descriptor: 7.10
Objective:

Content Description: High resolution graphics-introductory lesson to be used later with line graphs. High resolution graphics is more suitable for math.

Prerequisite Student Skills: HPLOT is the beginning point on your graph. HPOT requires two numbers for the beginning point, one across and one down. TO is the point that you take HPLOT to , and TO requires two numbers, one across and one down.

Activities:

Put holes of graph paper at the bottom of the page. Number across the top of the page, numbering by fives on the lines. Then number by fives down the left side of the paper. Again number on the lines. Numbers across may go from 0-259, and numbers down the page may go from 0-169. The student will graph his own initial. Be sure to type H (high resolution) before each command.

Example of the initial H.:

```
10 HGR
20 HCOLOR = 3
30 HPLOT 70,40 TO 70, 120
40 HPLOT 120,40 TO 120,120
50 HPLOT 70,80 TO 120,80
60 HPLOT 130,120
```

Type RUN to start program.

To clear screen, type:

TEXT

LIST

HOME

NEW

Instructional Resource: BASIC

Computer Lesson #5.27

Topic: Probability, Statistics and Graphing

Suggested Grade Level: 5

Mathematical Essential Element: 7

Descriptor: 7.8

Objective:

Content Description: Using a fraction to describe the probability of a given event

Prerequisite Student Skills: know the definition of probability

Activities:

Load Program

Choose 1 Find Your Number

Record in fraction form the probability in finding your number. Follow directions on screen. Use activity sheets 1-3 for more practice.

Instructional Resource: Bumble Games

The Learning Co.